Additive Layer Manufacturing: A new Perspective in Structural Design

Presented by
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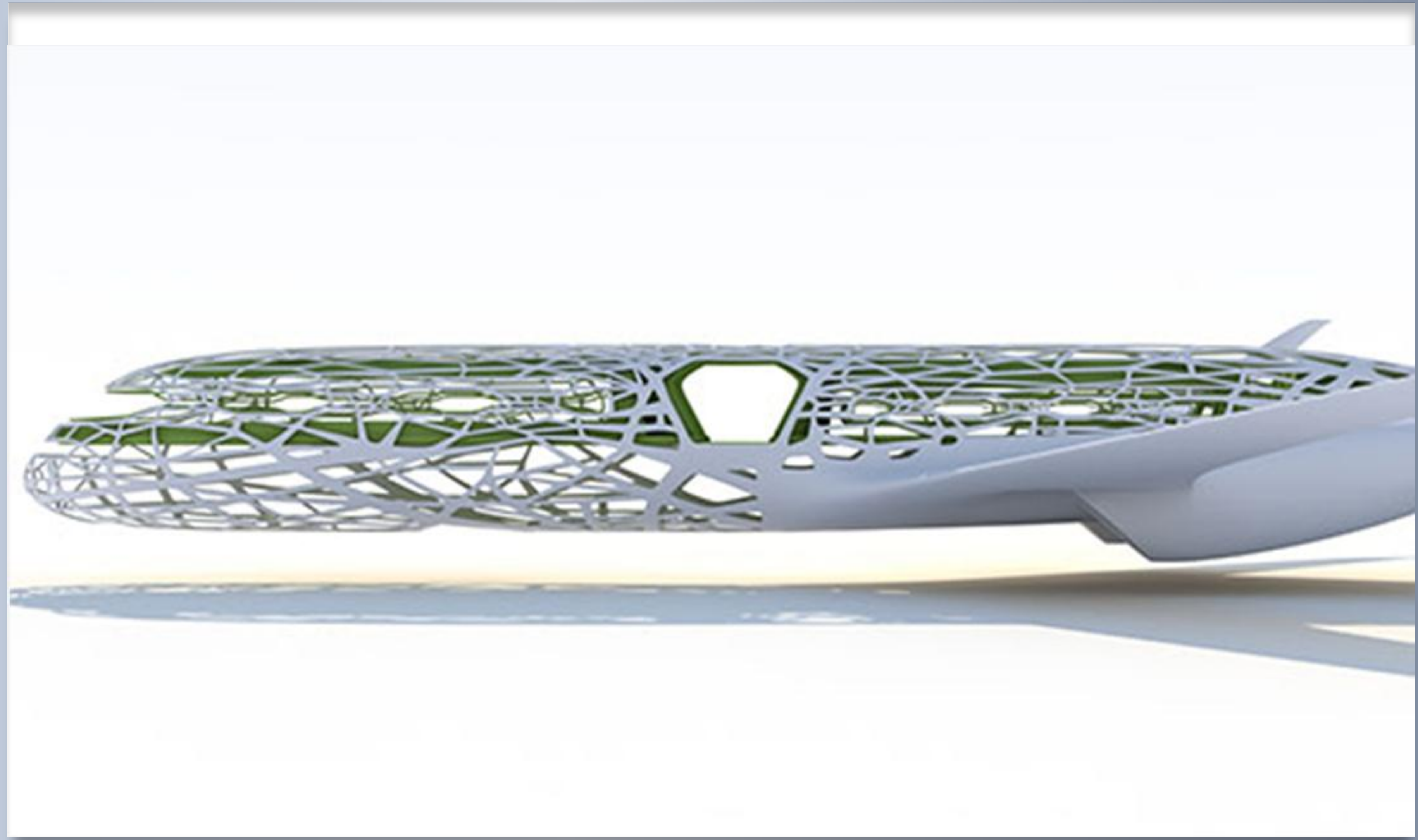
The Future Aircraft

AIRBUS

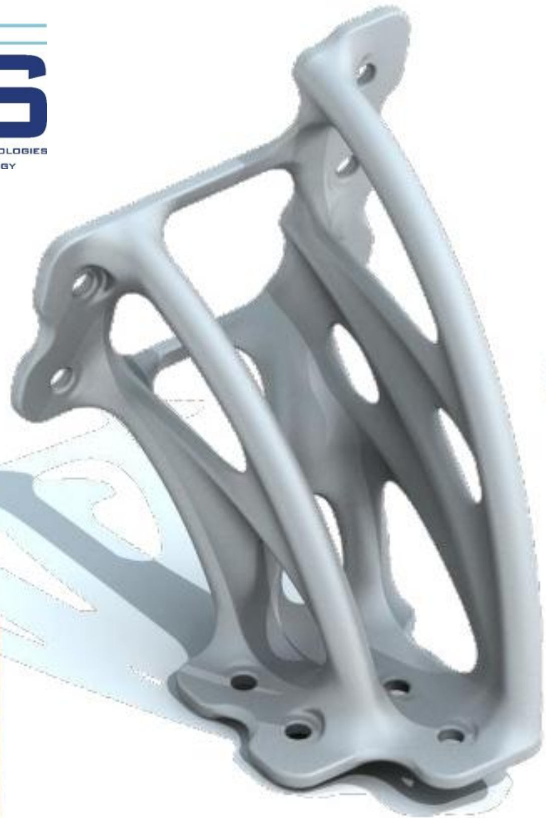
Airbus Concept Plane



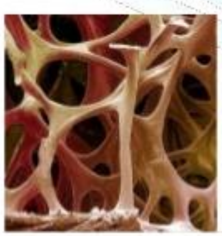
3D Printing, Additive Manufacturing, Prototyping

iLAS
Institute of Laser and System Technologies
Hamburg University of Technology

LZN
Laser Zentrum Nord



ALM allows manufacturing of very complex shapes



Source: iLAS / TUHH http://www.lzn-hamburg.de/technologien/weitere-qualifikationen/konstruktion/bionische-gestaltung.html

This Family of Technologies is gaining momentum world-wide.
There is a significant opportunity to change the Development Process to an optimum.

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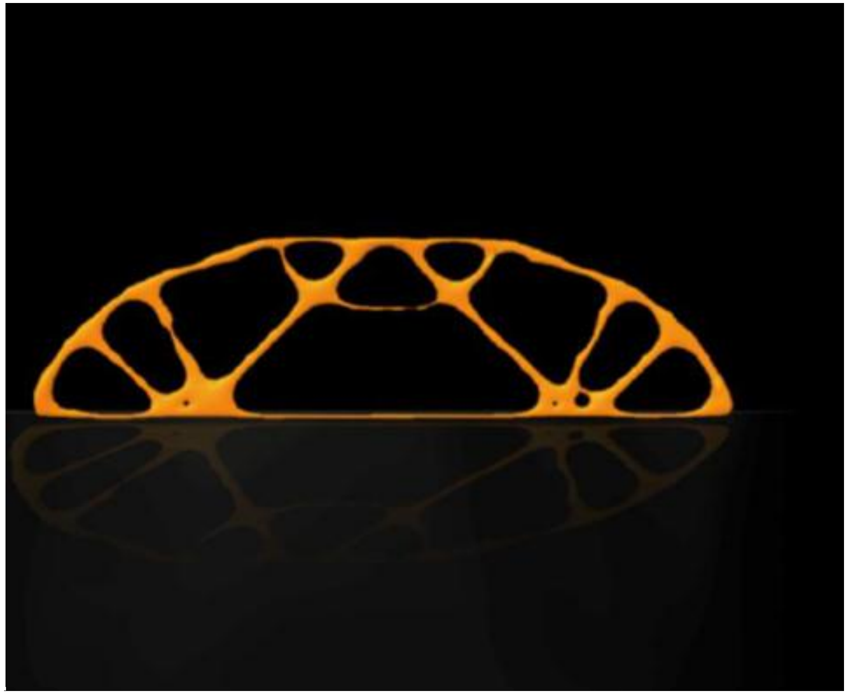
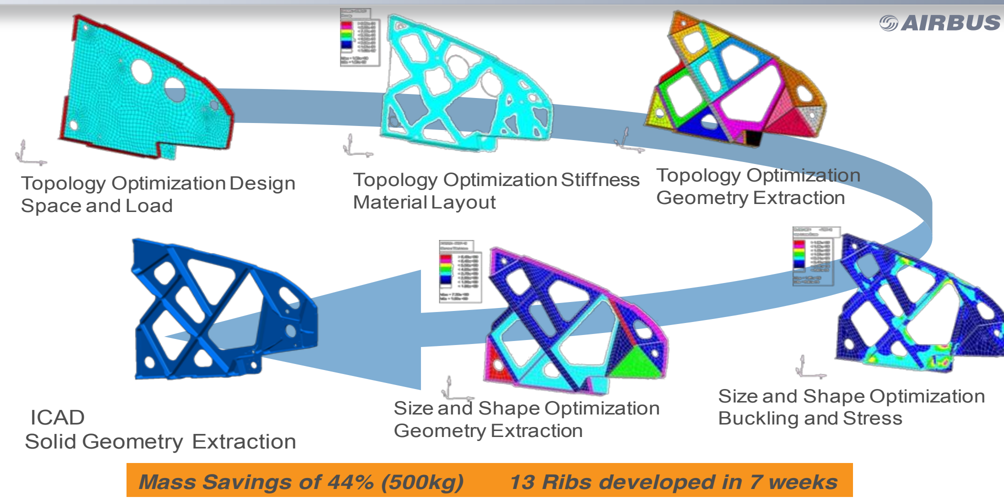
A main driver for 3D printing

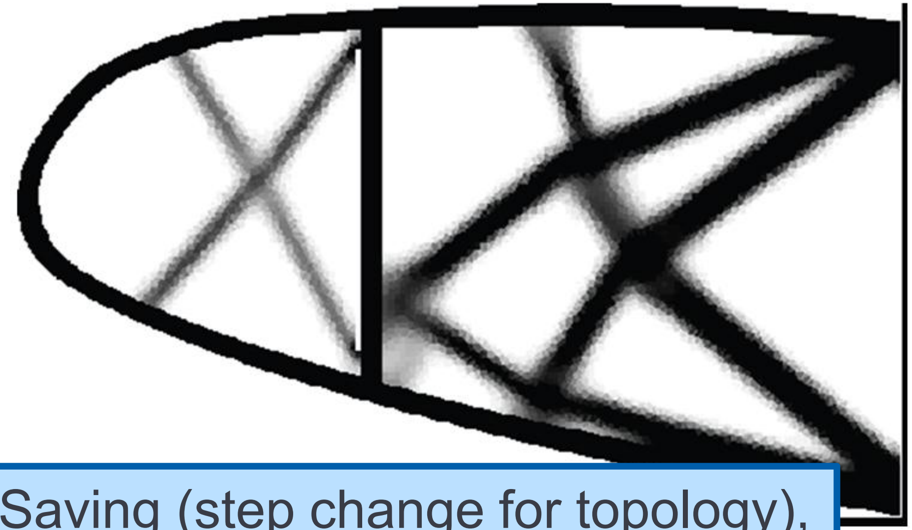
- Conceptual Topology Optimisation is an enabler for a new way of designing efficient Airframe structures.



Source: http://www.altairhyperworks.de/Product,60,Inspire.aspx

A main driver for 3D printing





Potential Drivers are Weight Saving (step change for topology), Cost Saving and increased Flexibility.

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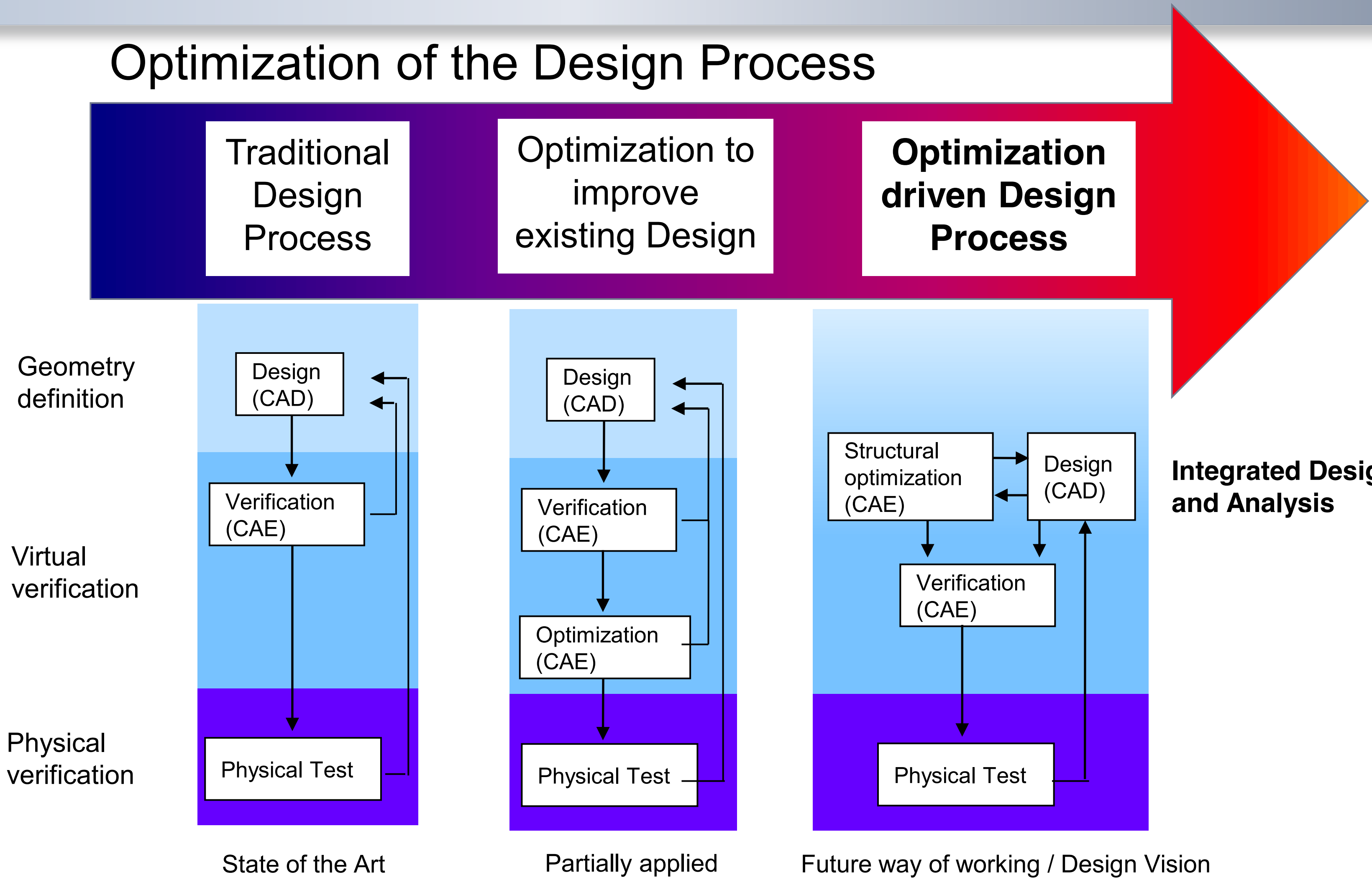
Challenges for Processes, Tools and Way of Working

Today people think in a subtractive way.
Processes and Tools are built in the same way.
A step change is needed to think and work in an „additive way“!

Scheme of Development Process Evolution



Stress and Design perimeters will converge.
a new Skill will be needed and is under definition.

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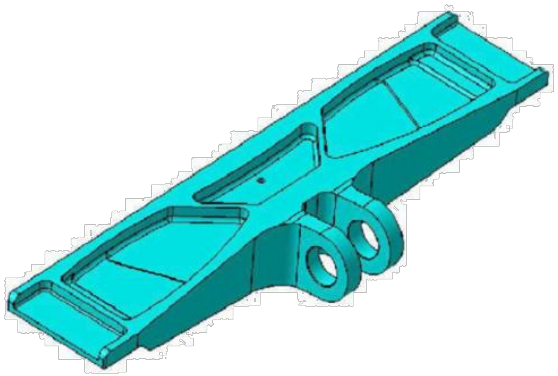
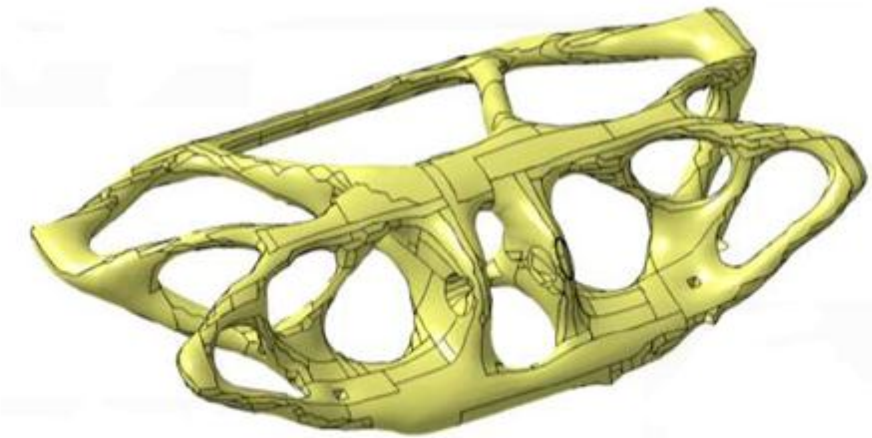
Example: Cargo Door Actuator Beam



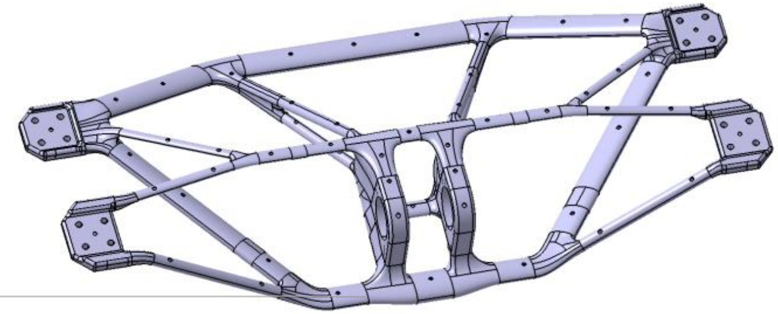
Actuator Beam today is a typical milling part



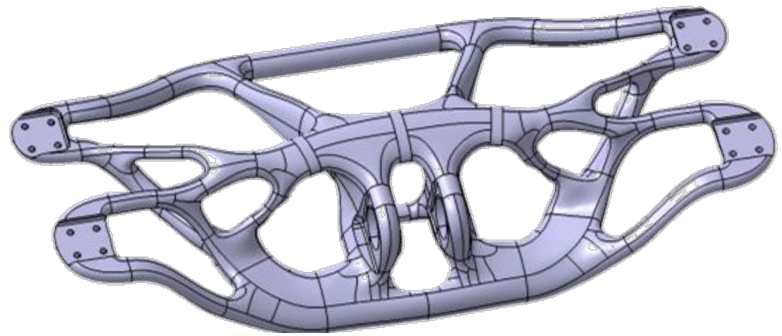
Topology Result taking into account all applied Loads

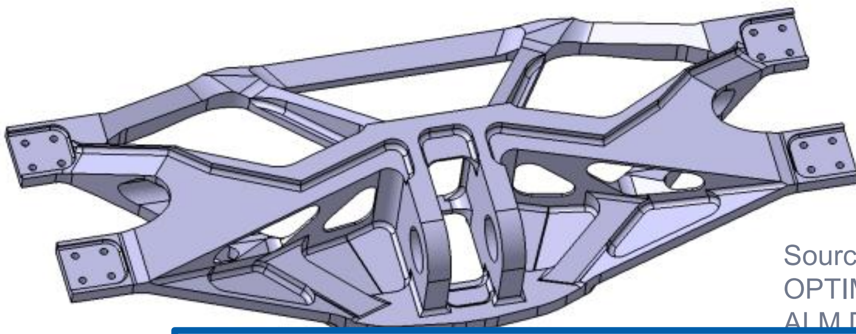
Actuator beam in different Manufacturing Processes

Actuator Beam as Additive Layer Manufacturing part



Actuator Beam as casting part





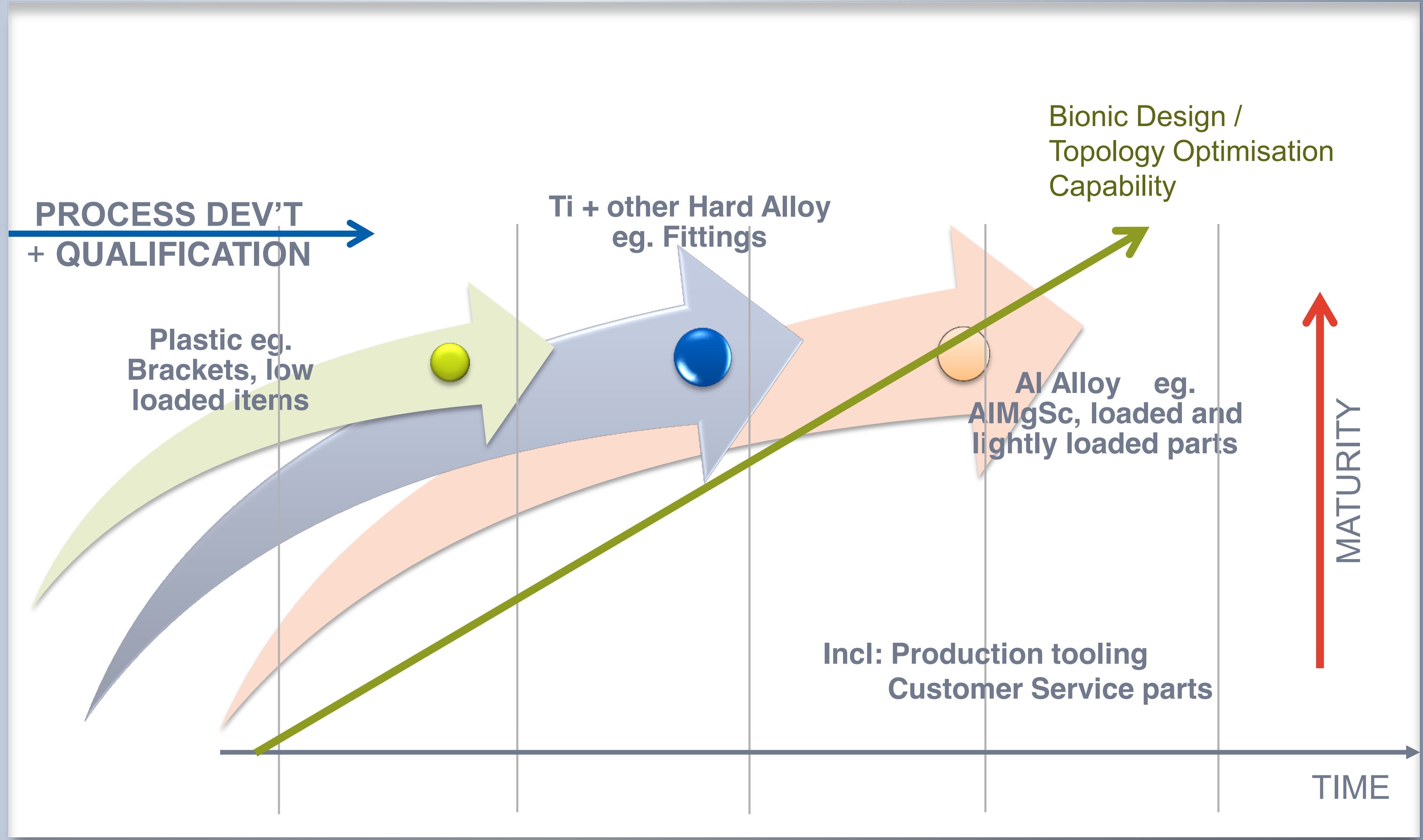
Actuator Beam as milling part

Source: Michael Mues; DESIGN INTERPRETATION OF TOPOLOGY OPTIMIZATION RESULTS AND DEVELOPMENT OF A METHOD FOR 3D ALM DESIGN WITH STIFFENER STRUCTURE, Diploma Thesis, FH Aachen

There is significant Weight Saving potential into new Design Concepts!

Additive Layer Manufacturing at Airbus

R&T mid-long term Strategy - Strategy Schematic



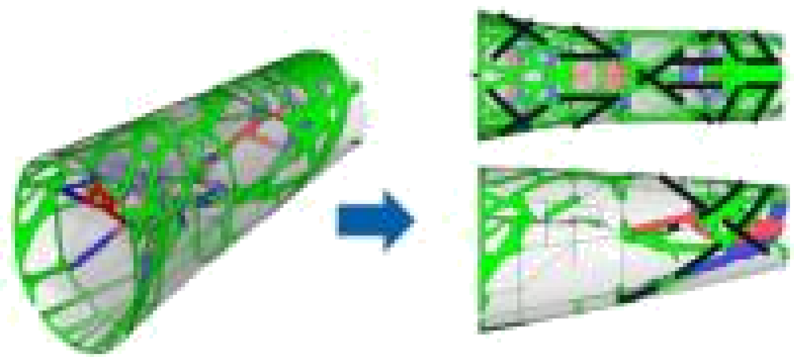
Potential Roadmap: Mid-Term

Today

Mid Term

Structural and System Installation Parts

CAO (Computer Aided Optimized) Primary Structural Components



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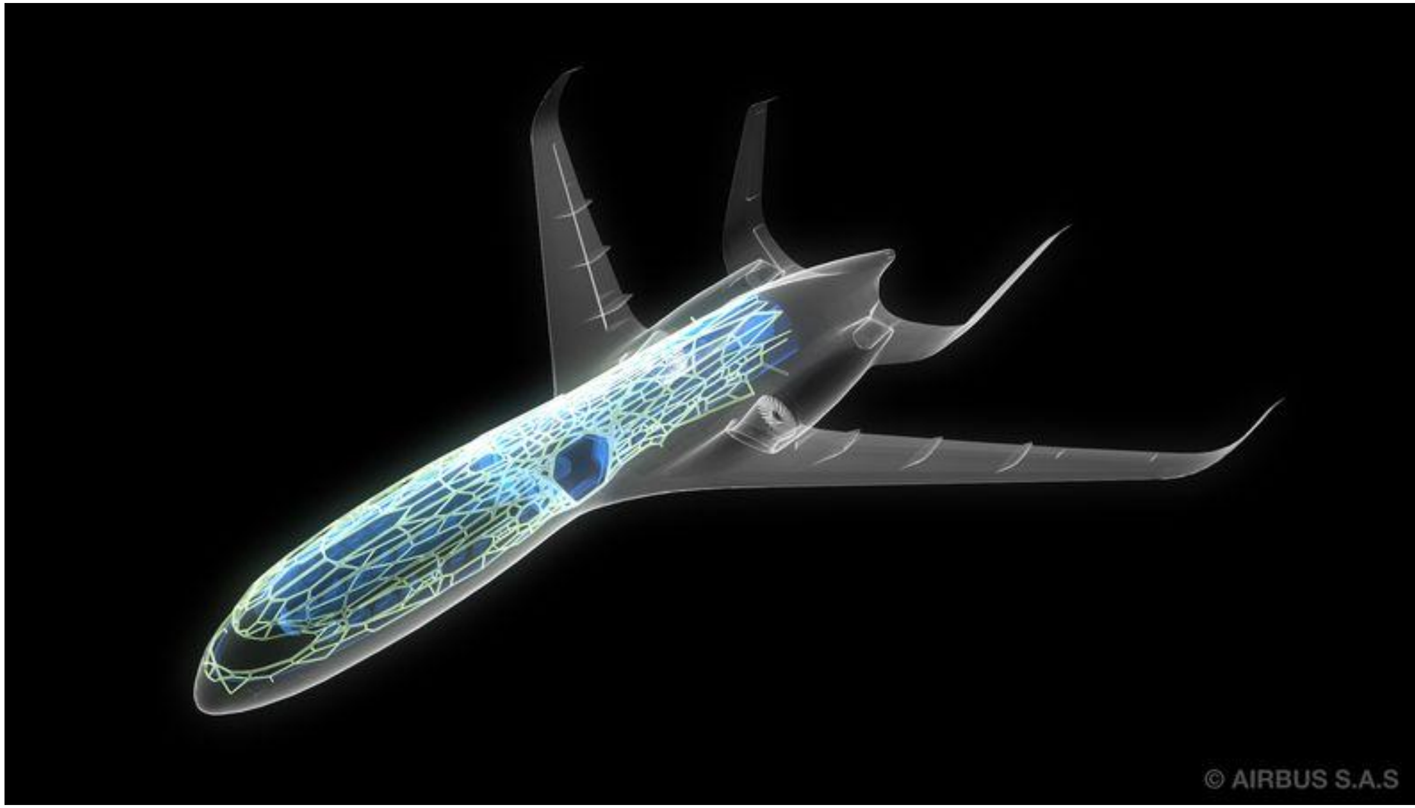
Potential Roadmap to Future Aircraft

Tomorrow



Integrated Multi Functional Component (Structure and System) through Multi-Material Additive Manufacturing

Thank you


AIRBUS concept plane
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